

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Cancelled)

2. (Cancelled)

3. (Cancelled)

4. (Cancelled)

5. (Currently Amended) [The optical device of claim 1, further comprising] An optical device that compensates for polarization mode dispersion (PMD) of an optical signal, comprising:

a first polarization state rotator that rotates the polarization angle of the optical signal in a frequency-dependent manner;

a first-order PMD compensator that receives the rotated signal and compensates for first-order PMD;

a second polarization state rotator that receives the first-order compensated signal and inversely rotates the polarization angle of the first-order compensated signal in a frequency-dependent manner to compensate for higher-order PMD; and

an interferometer disposed between the first polarization state rotator and the second polarization state rotator.

6. (Cancelled)

7. (Currently Amended) [The optical device of claim 1] An optical device that compensates for polarization mode dispersion (PMD) of an optical signal, comprising:

a first polarization state rotator that rotates the polarization angle of the optical signal in a frequency-dependent manner;

a first-order PMD compensator that receives the rotated signal and compensates for first-order PMD; and

a second polarization state rotator that receives the first-order compensated signal and inversely rotates the polarization angle of the first-order compensated signal in a frequency-dependent manner to compensate for higher-order PMD,
wherein the optical device has two adjustable delays.

8. (Cancelled)

9. (Currently Amended) [The optical device of claim 1] An optical device that compensates for polarization mode dispersion (PMD) of an optical signal, comprising:

a first polarization state rotator that rotates the polarization angle of the optical signal in a frequency-dependent manner;

a first-order PMD compensator that receives the rotated signal and compensates for first-order PMD; and

a second polarization state rotator that receives the first-order compensated signal and inversely rotates the polarization angle of the first-order compensated signal in a frequency-dependent manner to compensate for higher-order PMD, wherein a transform is performed according to the equation:

$$M(\omega) = R(\omega)R(\omega K) \begin{bmatrix} \exp(i\omega\tau/2) & 0 \\ 0 & \exp(i\omega\tau/2) \end{bmatrix} R^{-1}(\omega K), \text{ wherein } R \text{ is an}$$

operator whose effect is equivalent to rotation in Stokes space, its argument (θ or ωK in the equation above) is a three-dimensional rotation vector whose direction is the axis of rotation in Stokes space and whose angle is the angle of rotation, ω denotes the deviation from a central angular frequency of the optical signal, K (the magnitude of K) and τ relate to adjustable delays.

10. (Previously Amended) In an optical device that compensates for polarization mode dispersion (PMD), a method for adjusting the optical device, comprising the steps of:

adjusting a group delay device to compensate for first order PMD; and

adjusting a device that performs a frequency-dependent polarization rotation in Stokes space to rotate the polarization angle of an optical signal in a frequency dependent manner and to inversely rotate the polarization angle of the optical signal compensated for first-order PMD.

11. (Cancelled)

12. (Original) The method of claim 10, wherein the group delay device includes at least a first adjustable frequency-independent rotating device and a delay τ .

13. (Cancelled)

14. (Original) The method of claim 10, wherein the optical device is adjusted such that the polarization at a center frequency of an optical signal is substantially not changed.

15. (Cancelled)

16. (Cancelled)

17. (Currently Amended) [The method of claim 15] A method for compensating for polarization mode dispersion (PMD) of an optical signal, comprising:

first rotating the polarization angle of the optical signal in a frequency-dependent manner to generate an intermediate optical signal, wherein the first rotating causes a first transformation $\mathbf{R}(\omega\mathbf{K})$ of the optical signal;

compensating the intermediate optical signal for first-order PMD; and

second rotating the polarization angle of the intermediate optical signal in a frequency-dependent manner to compensate for higher-order PMD, wherein the second rotating causes a second transformation $\mathbf{R}^{-1}(\omega\mathbf{K})$, wherein ω denotes the deviation from a central angular frequency of the optical signal and \mathbf{K} relates to a variable delay,

wherein compensating the intermediate optical signal comprises:

splitting the intermediate optical signal into a plurality of portions;

delaying at least one of the portions; and
combining the at least one delayed portion with at least a second portion of the plurality of portions.

18. (Cancelled)

19. (Cancelled)

20. (Cancelled)

21. (Cancelled)

22. (Currently Amended) [The method of claim 15] A method for compensating for polarization mode dispersion (PMD) of an optical signal, comprising:

first rotating the polarization angle of the optical signal in a frequency-dependent manner to generate an intermediate optical signal, wherein the first rotating causes a first transformation $R(\omega K)$ of the optical signal;

compensating the intermediate optical signal for first-order PMD;

second rotating the polarization angle of the intermediate optical signal in a frequency-dependent manner to compensate for higher-order PMD, wherein the second rotating causes a second transformation $R^{-1}(\omega K)$, wherein ω denotes the deviation from a central angular frequency of the optical signal and K relates to a variable delay,

wherein a transform is performed according to the equation:

$$M(\omega) = R(\omega)R(\omega K) \begin{bmatrix} \exp(i\omega\tau/2) & 0 \\ 0 & \exp(i\omega\tau/2) \end{bmatrix} R^{-1}(\omega K), \text{ wherein } R \text{ is an}$$

operator whose effect is equivalent to rotation in Stokes space, its argument (θ or ωK in the equation above) is a three-dimensional rotation vector whose direction is the axis of rotation in Stokes space and whose angle is the angle of rotation, ω denotes the deviation from a central angular frequency of the optical signal, K (the magnitude of K) and τ relate to adjustable delays.

23. (Currently Amended) An optical device that compensates for polarization mode dispersion (PMD) of an optical signal, comprising:

- a first polarization state rotator that rotates the polarization angle of the optical signal in a frequency-independent manner;

- a second polarization state rotator that rotates the polarization angle of the optical signal in a frequency[dependent]-dependent manner;

- a first-order PMD compensator that receives the rotated signal and compensates for first-order PMD; and

- a third polarization state rotator that receives the first-order compensated signal and inversely rotates the polarization angle of the first-order compensated signal in a frequency-dependent manner to compensate for higher-order PMD.